

9. Is the dialect of the Kohistanis of Kabulistan a peculiar one, or related to the Lawghans, or that of the inhabitants of Kaferstan?

10. The Kirdhkis mentioned by Mr. Elphinstone as forming part of the population of Eastern Kabulistan, speak an Indian dialect; is this dialect nearly related to Punjab? and are the Kirdhkis to be regarded as emigrants from India in comparatively modern times, or remains of the ancient Hindu population? As far down as to the times of Mahmud of Ghazna it may be shown, that the inhabitants of Kabulistan were Indians, and most probably direct descendants of the Gurves, Ascadars and Gandars spoken of by the ancients.

ART. V.—*On the detection of Arsenical Poisons by MARSH's process—its inapplicability to the Sulphurets of Arsenic—and the mode of obviating the fallacy occasioned by Antimonial Compounds.* By W. B. O'SHAUGHNESSY, M. D. Acting Joint-Secretary to the Asiatic Society.

In December, 1836, I exhibited to a large party at Government House the very beautiful process invented by Mr. MARSH of Woolwich, for the detection of minute quantities of arsenical poisons. The method consists in placing the suspected substance in very dilute sulphuric acid, and introducing a slip of pure zinc. The hydrogen is evolved in combination with the metallic arsenic, and on examination presents most distinct and remarkable phenomena. If ignited, the flame is of a leaden blue color, and diffuses a powerful odour of garlic, and a dense white smoke. If the flame be reduced to the size of a pea, and applied to the interior of a thin glass tube, a crust of metallic arsenic is formed on the tube, surrounded by a white ring of arsenious acid. To this, by a little dexterous management, the several tests for arsenic may be applied, namely the ammoniacal-nitrates of silver and copper, and the sulphuretted hydrogen gas.

A few months after the meeting referred to, I had occasion to apply the process to the examination of the contents of the stomach of the Munshi of the Coroner's Office, who had been poisoned by arsenic contained in a ball of sweetmeat. The results were quite conclusive, and were, moreover, checked by the performance of the common process on a portion of the large quantity of arsenic adherent to the mucous membrane of the stomach.

Up to the time of this occurrence, and indeed for some months later, I participated in MARSH's opinion, that this admirable process was applicable to all the arsenical poisons—to those not dissolved by water

as well as those soluble in that liquid; but on the occasion of a second death by one of these poisons, which came under investigation before the Police in 1838, I had proof that this opinion was erroneous.

The deceased was a young female, to whom a large quantity of crystallized yellow orpiment (sulphuret of arsenic) had been administered in curry, and in consequence of which she died after a few hours' illness. On examination of the body a quantity of yellow powder was readily separated from the contents of the stomach, and the mucous membrane of that organ was observed to be sprinkled all over with shining gold-like crystals.

On applying MARSH'S process to a portion of the yellow matter, no indications whatever of arsenic were obtained.

A quantity of the powder was then dissolved in liquid ammonia, and MARSH'S process applied, still with negative results.

I then tried the effect of converting the sulphuret into arsenious acid, which was done by boiling the yellow matter with a few drops of nitric acid. On diluting the solution with water, it was found that a single drop tested by MARSH'S method gave a most distinct metallic crust, which was readily proved to be arsenic by the application of the silver, copper, and sulphuretted hydrogen gas.

These facts are of much practical importance, especially in this country, where orpiment is commonly used as a poison. They shew that in all cases where arsenic may have been employed, we must, in the event of MARSH'S process proving negative, apply a modification of the experiment I have related, so as to bring the sulphuret of arsenic into the state of an oxide. For this purpose the insoluble parts of the contents of the stomach should be boiled in a capsule of glass or porcelain, with small quantities of nitric acid, until red fumes are no longer given off. The mass should then be diluted with water, neutralized with carbonate of potash or soda, and, lastly, examined by MARSH'S method.

To shew the delicacy of this process, I may state, that I have applied it to the one-tenth part of a grain of orpiment mixed with four ounces of solid and fluid animal matter. By boiling with nitric acid, diluting with water and neutralizing, ten ounces of a liquid mixture were obtained, from half a fluid ounce of which the metal was reduced, although the quantity could not have been quite the 200th part of a grain.

I have next to notice the only serious fallacy to which this most ingenious method is liable, and which was first pointed out by Mr. Thomson in the *Philosophical Magazine* for May, 1837. It consists in the indications given by the soluble antimonial compounds, several of which are employed in medicine, one especially as an emetic in the treatment of cases of suspected poisoning.

By repeating MARSH'S process on a mixture containing tartarized antimony, it will be seen that the gas evolved burns with nearly the same color, and deposits a similar crust on the glass tube.

On examining closely the distinguishing characters of this crust, it is very possible for an experienced eye to distinguish it from one produced by arsenic. The eye however must be experienced indeed, and that to a degree which very few observers can be supposed to lay claim to. Again, the sulphuretted hydrogen produces with crusts of arsenic and antimony yellow stains so faintly differing in tint as to lend even a practised experimentalist but little assistance in his research. The sulphate of copper, again, gives only such indications as are too faint to be relied on individually, though of some value as corroborating evidence.

Nevertheless the silver test can be readily applied so as to give unquestionable evidence of the nature of the crust of metal and of oxide obtained by MARSH'S process. This may be accomplished by a method which differs slightly from one pointed out by Mr. Thomson in the paper alluded to. The tube on cooling should be moistened with a solution of nitrate of silver in distilled water, and then held over the mouth of a bottle containing strong ammonia, so that the vapor may traverse the tube. If the crust be arsenical, it instantaneously assumes a vivid canary color, owing to the formation of the arsenite of silver. No approach to such an effect is produced by the antimonial compounds, so that this test affords a simple, but most conclusive check on MARSH'S invaluable method

It is right to repeat a precaution as to the zinc employed. That found in the bazar often contains traces of arsenic, and should always be tested itself by MARSH'S process before being employed in pursuit of any legal investigation. Secondly, the zinc by which arsenic has been once detected should never be used again, as the surface often unites with and retains as much of that metal as may falsify a further experiment.